

# INNOVATION IN BUILDING DESIGN

A cost-cutting flat cable system for building electrification leads a selection of spinoffs in the field of construction

**T**he latest answer to power distribution systems is to sweep them under the carpet," said the trade publication Facilities Design & Management Monthly. "Unknown only a few years ago, flat conductor cable is being highly praised as the best cost-saving office support system ever developed. Speedy installation, inexpensive rewiring and simplified building construction are the lures of this new technology. . . . Like many other technological

achievements, flat cable is a space program spinoff, a development of the National Aeronautics and Space Administration."

Flat conductor cable, or FCC, was developed of necessity as aircraft and spacecraft became increasingly complex. In the never-ending battle to reduce the size and weight of components, the use of thin flat wire—instead of the relatively thick and protrusive round cable—provided a dramatic reduction of the space occupied by the many

miles of power distribution lines in an aerospace vehicle.

NASA recognized that FCC offered similar benefit in design of electrification systems for commercial buildings and, in the latter 1960s, undertook to promote non-aerospace use of FCC. Under the Technology Utilization Program, intended to encourage secondary application of technology in the interests of national productivity, NASA funded a project in which Marshall Space Flight Center developed prototypes for several FCC applications.

Since industry participation was essential to large-scale adoption of flat cable, NASA—in 1975—sponsored formation of a consortium composed of a dozen firms engaged in manufacture of electrical hardware and associated activities. Using Marshall's early work as a departure point, the member companies pooled their resources and technology to develop complete FCC systems. These systems encompass not only the cable but the sheathing, connectors, tools and other equipment necessary to facilitate FCC use by designers and builders. Subsequently, the use of FCC covered by carpet tiles in commercial buildings obtained approval from Underwriters Laboratory and listing in the National Electrical Code established by the National Fire Protection Association.

An example of an undercarpet flat cable system is Versa-Trak®, produced by Thomas & Betts Corporation, Raritan, New Jersey, which has been used in more than 1,500 installations. Versa-Trak cable has three layers: a top copper grounding shield, a bottom plastic abrasion shield, and the conductor

*An undercarpet flat cable installation is shown in foreground in this view of the Sun Refining and Marketing Company's offices in Philadelphia; the carpet tiles are produced by Milliken Contract Carpets, LaGrange, Georgia. Flat conductor cable offers cost savings in simplified building construction, reduced installation time and ease of alteration.*





*With power and telephone lines out of sight beneath the carpet, and with no floor-to-ceiling wiring enclosures or other ducting, flat cable gives interior designers new latitude in planning attractive "open landscape" office layouts. The photos at right and below are views of the first installation of flat conductor cable, the offices of Facility Management Institute, Ann Arbor, Michigan.*



layer sandwiched in between. The cable is covered with protective adhesive steel tape.

The first FCC installation, in 1979, was in the headquarters building of Facility Management Institute (FMI), a division of Herman Miller Research Corporation, Ann Arbor, Michigan. FMI was organized to focus on the research and educational needs of facility managers. Among the Institute's functions is fostering new technologies that enhance office environments and thereby improve employee productivity. After three years experience with undercarpet wiring in its own facility, FMI pronounces flat cable "a great advancement in providing flexibility in office environments."

Only as thick as a credit card, FCC can be installed between floor and carpet tile without evidence of its presence; this makes possible elimination of the ducts—in floors, walls, ceilings or concrete slabs—ordinarily required to accommodate wiring. That offers big savings in new building construction; estimates range from 13 to 40

percent lower than conventional wiring costs. An additional efficiency is the fact that developers can delay decisions on where to put the wiring until they know who will rent the office and what kind of office it will be. When it becomes necessary to relocate work stations, as it frequently does in business operations, FCC significantly reduces the task of changing the electrical system: workers need remove only the carpet squares involved in rewiring, not the whole floor covering—again providing a monetary saving.

There is a bonus in planning office arrangements. Freedom from ducts and other traditional accommodations for wiring offers new latitude in designing airy, "open landscape" office layouts, which are becoming increasingly popular. Under the impetus of these multiple advantages, flat cable is gaining wide acceptance among builders, building managers and interior designers, and sales projections indicate that the fledgling industry is likely to expand rapidly.

*Flat cable allows speedier changing of work stations because workmen need only remove the carpet tiles involved in rewiring. The above photo illustrates minimal disruption of office activities as the technician installs Versa-Trak flat cable manufactured by Thomas & Betts Corporation, Raritan, New Jersey.*